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PATENT SPECIFICATION

671,111



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COMPLETE SPECIFICATION

Improved Means for Transporting or Distributing Concrete or the like

WE, COMPAGNIE PARISIENNE D'OUTILLAGE
À AIR COMPRIMÉ of 11^{ème}, Rue Roquépine,
Paris-8^e, France, a French body corporate,
do hereby declare the nature of this invention
5 and in what manner the same is to be per-
formed, to be particularly described and
ascertained in and by the following state-
ment:—

The present invention relates to pneumatic
10 conveyors for concrete and like material.

In a known device of this kind, it has been
proposed to use an open hopper the lower
part of which is connected to a small recep-
tacle. A non return flap valve is provided
15 between hopper and receptacle. In this
receptacle abuts a pipe carrying compressed
air and at its bottom part said receptacle
receives another stream of air or water
adapted to expel the material contained
20 therein through another valve. In this
apparatus, the main mass of material lays
open on the air and the danger exists that
it will not be propelled towards and in said
receptacle. Such danger arises especially
25 when dealing with concrete or the like.

In a still other apparatus intended for the
transport of pulverised material, use is made
of a transport tank comprising inside an open
ended air duct with a split partition. A screw
30 stirrer is located inside said tank, in order to
avoid any clogging of the material. A discharge
pipe is situated on the lateral wall of the
tank. This apparatus could hardly be used
for clogging materials. On the other hand,
35 it is indispensable to have mechanical means
for avoiding clogging effects. Furthermore,
the air duct inside the tank risks to be clogged.
Finally, the lateral situation of the discharge
pipe prevents any thorough discharge action.

40 It has been proposed in the case of an
apparatus intended for the introduction of
solid particles into a steam or air-delivery
line to have three chambers arranged ver-
tically in line and communicating centrally
45 by main valves, the upper chamber constitut-
ing a hopper working at atmospheric pressure,
the lower chamber a high pressure chamber
under constant pressure supply, and the
middle chamber one operating at one time

at atmospheric pressure, and at another time 50
at the same high pressure as the lower cham-
ber, the solid particles passing from the
upper hopper to the middle chamber while
both are at atmospheric pressure, and passing
from the middle chamber to the lower cham- 55
ber while both these chambers are under
pressure higher than atmospheric (during
which time the upper chamber or hopper is
closed to the middle chamber), and finally
passing into a delivery pipe line into which 60
a pressure fluid supply is arranged parallel
to said pipe line and the particle flow.

In other known devices employed for
handling coal, use has been made of an air
pipe having a place where the handled 65
material may collect. Air is blown in this
pipe and, at the beginning of this operation,
the air volume and its velocity are insufficient
to carry the material beyond the place of
collection. When the collection is big enough 70
to close the pipe, a sufficient air pressure is
supplied to free the pipe.

In still other older devices of this type, it
has been proposed to have a bunker followed
by and connected to a hopper. A valve is 75
located between hopper and bunker and the
bottom portion of the hopper has the shape
of a vertical Venturi-tube surrounded by a
Venturi nozzle. A first air supply is connected
with said nozzle around the Venturi-shaped 80
end of the hopper; a second air supply abuts
in a tube continuing the said nozzle. This
apparatus is also provided with a third pipe
for balancing the pressure abutting laterally
into the bunker. The disadvantage of such 85
a device resides in the necessity of having
Venturi-tubes, of dividing the hopper in a
series of different elements and of using three
different tubes for air supply.

In another known apparatus for the lifting 90
of coke breeze, wet sand and the like use is
made of a main receptacle the upper part of
which is connected to a separate hopper
through a non-return valve. An air pipe
abuts laterally into said hopper which is 95
open. The said receptacle contains in its
middle portion a tube held in place by suit-
able transversal supports and has its lateral

walls provided with pipes introducing compressed air. A pressure pipe is also provided for introducing compressed fluid at the upper part of the receptacle, through the lateral pipes and into a discharge pipe located below said receptacle.

Finally, it has also been proposed to use pulsations of the air pressure to effect the automatic control of the conveyance of pulverised material in a plurality of pressure vessels.

In contradistinction thereto, the present invention relates to a pneumatic conveyor for concrete or like material which is very simple, efficient and does not necessitate any mechanical propulsion means. Furthermore, this apparatus may be used in a continuous manner with a continuous air supply.

The invention comprises a pneumatic conveyor for concrete and like material, comprising a container or hopper which in use is closed at its top and is provided with inlet means secured thereon and through which the concrete or like material is poured directly by the operator into the container, the upper part of said container being connected by a tube with a continuous supply of compressed gas adapted to act in the direction from top to bottom on the entire mass of material contained in said container and to cause a heaping or a packing thereof in the direction of the discharge passage of said container, the lateral walls of said hopper being continuous and solid without any openings, and the inside space being clear of any moving valvular or stationary members so as to allow the unimpeded flow of material to the discharge passage and being entirely available for holding the material, the discharge passage being located at the lower part of the said hopper axially with respect thereto, the container comprising a discharge pipe means directly connected with said discharge passage and disposed substantially perpendicular to the longitudinal axis of said container and passage and connected permanently by a supply pipe to a continuous supply of compressed gas, said supply pipe having a part thereof parallel to the discharge pipe, the compressed gas being adapted to flow through said supply pipe into said discharge pipe and to evacuate or propel the plug of material formed periodically in the said pipe near the discharge passage under the said continuous heaping and packing action due to the pressure prevailing in the upper portion of the container and exerted on the entire mass of said material in the direction from top to bottom.

One form of construction of a pneumatic conveyor according to the invention is illustrated, merely by way of example, in the accompanying drawing.

According to this constructional example,

the conveyor comprises a hopper 1, designed to receive the concrete or the like at an inlet 2. A valve of any kind, actuated by a lever 3 for instance, enables the hopper to be opened for filling purposes and then closed again.

An inlet connection 4 for compressed gas leads to the interior of the hopper. This inlet is so designed as to create a predetermined pressure in the interior of the hopper 1.

The hopper terminates in a discharge passage 5, bent or straight, for distributing the concrete or the like. The shape of this rump has been designed with a view to permitting the best flow of the concrete, on the one hand from the hopper to the passage and on the other hand from the passage to the conveying conduit. This discharge passage is permanently connected by piping 6 to a source of compressed gas, not shown. This source may be the same as the source that feeds the hopper 1. The diameter of the piping 6 is calculated so as to create a sufficient pressure in the passage 5, but without it being greater than the pressure prevailing in the hopper.

The operation of the apparatus described is very simple. The valve or flap that normally closes the top of the hopper is opened by acting upon the lever 3. The hopper is then filled with concrete, after which the valve is closed. The cock 7 for admitting compressed gas into the conduits 4 and 6 is opened. The concrete, under the action of the pressure exerted on the upper part of the hopper, descends and accumulates in front of the discharge passage to form a plug. At this moment, the pressure created in this conduit manifests itself and drives forward the plug of concrete, being replaced, however, by another plug practically at once.

The apparatus may be stationary or portable. In the drawing, the apparatus has been shown fixed on to supports 8.

It will be clearly seen that the principle of the apparatus consists in causing a piling of the concrete towards the discharge conduit, followed by an unstopping or evacuation of this conduit.

The invention is not restricted in any way to the form of construction shown and described which has been given merely by way of example except that it is limited by the claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A pneumatic conveyor for concrete and like material, comprising a container or hopper which in use is closed at its top and is provided with inlet means secured thereon and through which the concrete or like material is poured directly by the operator

into the container, the upper part of said container being connected by a tube with a continuous supply of compressed gas adapted to act in the direction from top to bottom on 5 the entire mass of material contained in said container and to cause a heaping or a packing thereof in the direction of the discharge passage of said container, the lateral walls of said hopper being continuous and solid 10 without any openings, and the inside space being clear of any moving, valvular or stationary members as so to allow the unimpeded flow of material to the discharge passage and being entirely available for 15 holding the material, the discharge passage being located at the lower part of the said hopper axially with respect thereto, the container comprising a discharge pipe means directly connected with said discharge passage 20 and disposed substantially perpendicular to the longitudinal axis of said container and

passage and connected permanently by a supply pipe to a continuous supply of compressed gas, said supply pipe having a part thereof parallel to the discharge pipe, the 25 compressed gas being adapted to flow through said supply pipe into said discharge pipe and to evacuate or propel the plug of material formed periodically in the said pipe near the discharge passage under the said 30 continuous heaping and packing action due to the pressure prevailing in the upper portion of the container and exerted on the entire mass of said material in the direction from top to bottom. 35

2. A pneumatic conveyor for concrete and like material substantially as described and represented in the annexed drawing.

Dated this 17th day of December, 1948.

MARKS & CLERK.

This Drawing is a reproduction of the Original on a reduced scale

